Developing Sustainable Renewable Energy in California

UC Berkeley
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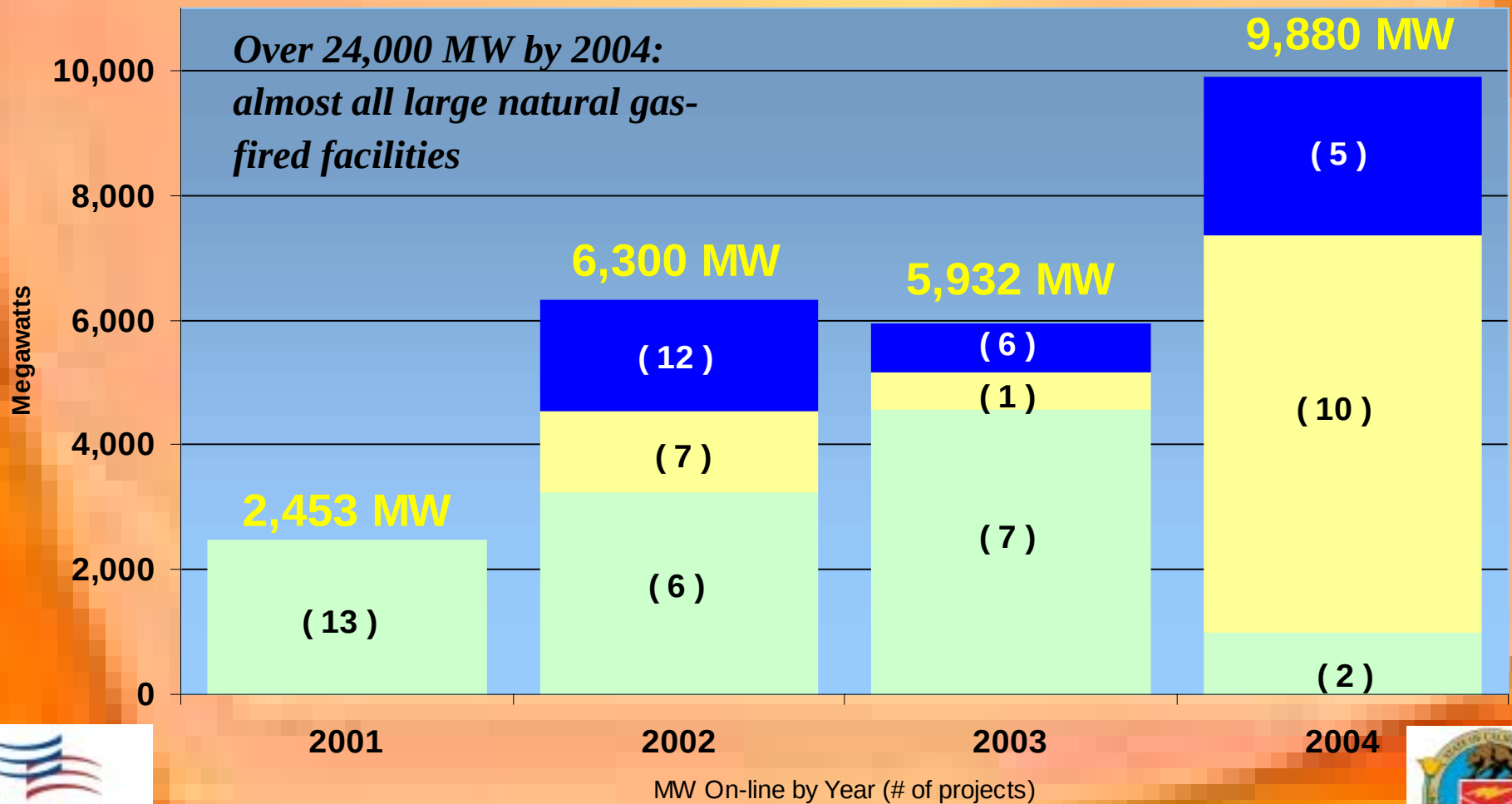
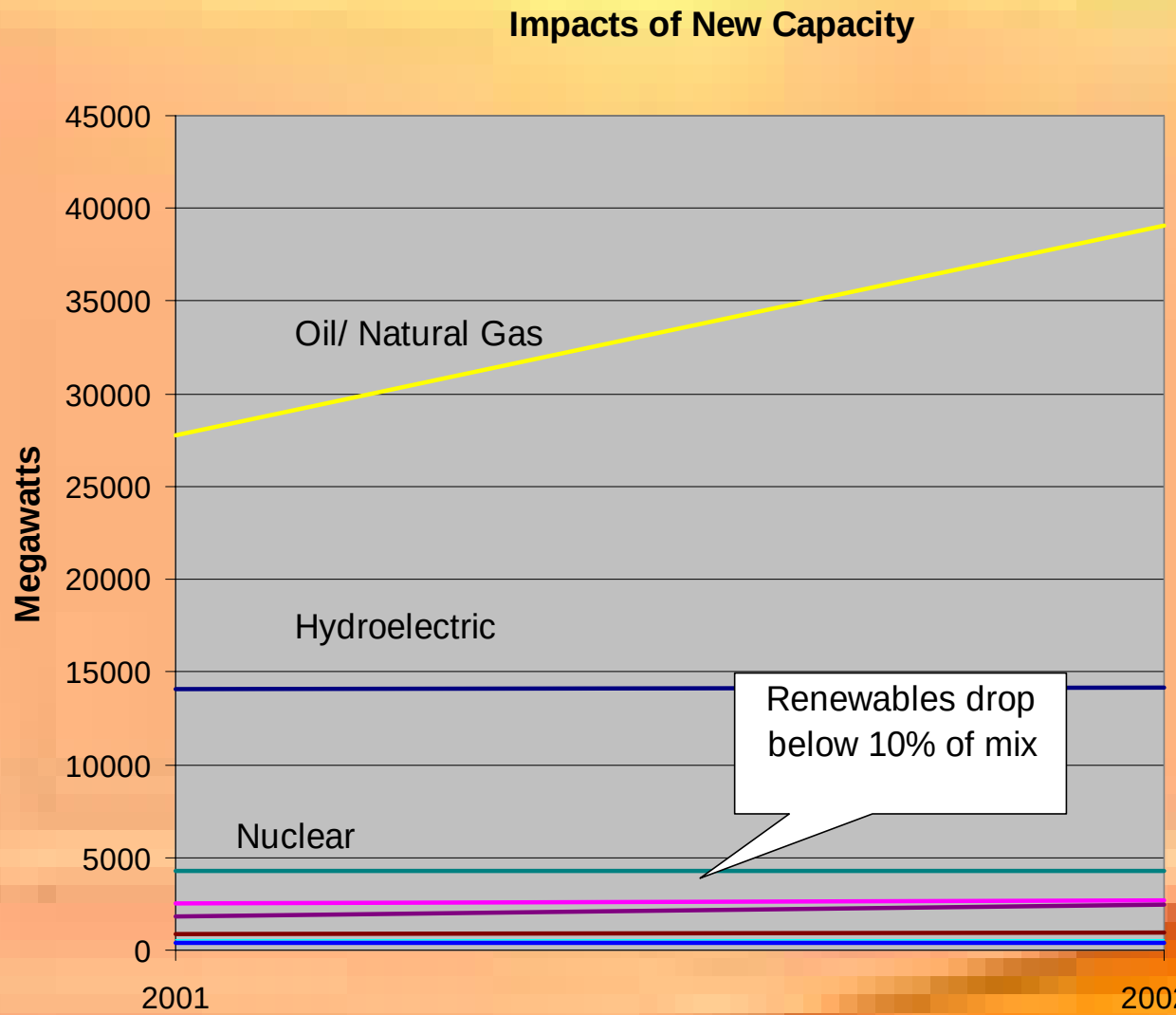
George Simons
PIER Renewables
California Energy Commission

New Power Plant Development in California



Impact of New Generation on Mix

After 2003, over 60% of California's electricity generation will be based on natural gas. That will increase to over 67% by 2004.



Concerns With Proposed Power Plants

- **Affordability**
  - ***Subject to price shocks if shortages occur with natural gas***
  - ***Large plants don't defer need for costly T&D upgrades or expansions***
  - ***Proposed plants built with long term contracts that will be borne by rate payers (locked in costs)***
- **Reliability**
  - ***Single fuel dependency creates vulnerability to supply disruptions***
  - ***Large plants: fewer eggs in the electricity basket (security issue)***
  - ***Large plants continue dependence on large transmission lines so fail to address reliability associated with high congestion***
- **Environmental Impacts**
  - ***Natural gas still has emissions even with new approaches***
  - ***Fails to use indigenous resources which can address existing impacts***
- **Choice**
  - ***Large plants limit customer choice to selecting a provider--no control***

The Importance of Renewables

- **Improved Electricity Affordability**
  - ***Lowers or eliminates fuel costs***
  - ***Can provide enhanced value (e.g., BIPV)***
  - ***Renewable DG can defer T&D upgrades or expansion costs***
- **Increased Reliability and Security**
  - ***Indigenous fuel supplies less subject to disruption***
  - ***Balanced portfolio more responsive to volatile market conditions***
- **Cleaner and Safer**
  - ***Inherently cleaner forms of power generation(PV, wind, small hydro)***
  - ***Can help resolve existing environmental issues (opening field burning, landfill gas emissions, etc.)***
- **Greater Choice**
  - ***Resource portfolio provides options***
  - ***Renewable DG gives customers choices they control***

CEC Programs Supporting Renewables

- **Renewable Energy Program**
  - ➢ ***Supporting commercial and emerging renewables***
- **Peakload Reduction Program**
  - ➢ ***Increasing peak generation using renewables***
- **Public Interest Energy Research (PIER) Program**
  - ➢ ***Energy research and development on renewables***

Renewable Energy Program

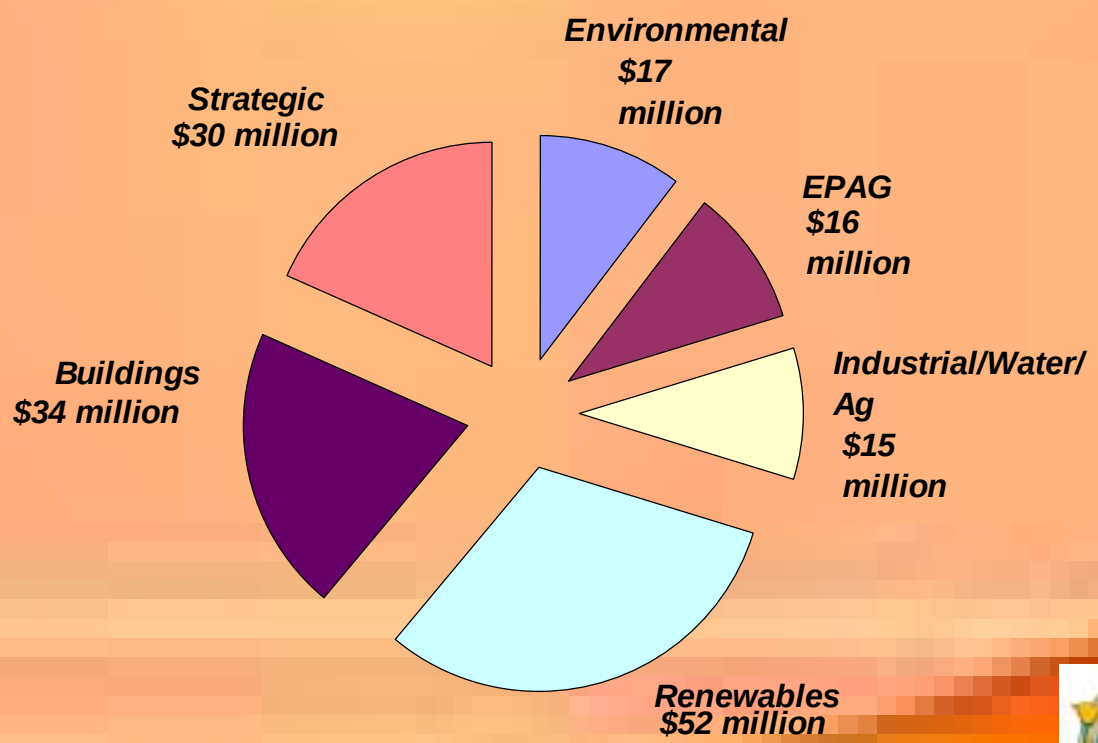
- **$135 million per year for renewable energy**
  - ➢ *Established to help renewable energy industry make the transition to a deregulated electricity market*
  - ➢ *Support to already commercialized renewable technologies*
- **Four main accounts**
  - ➢ *Existing Renewables Account*
    - ✓ *$243 million:existing renewable energy facilities*
  - ➢ *New Renewables Account*
    - ✓ *$162 million:new renewable power plants*
  - ➢ *Emerging Renewables Account*
    - ✓ *$54 million: emerging renewable technologies (PV, wind, solar thermal electric and renewable fuel cells)*
  - ➢ *Customer Account*
    - ✓ *$81 million targeted: customers purchasing "green" electricity*

Peakload Reduction Program

- **Primary Focus**
  - ➢ *Reducing peak demand and increasing peak generation capacity*
- **$900 million: Funding From AB970, SB5x and AB29x**
  - ➢ *$125 million provided to renewables*
  - ➢ *$115 million from AB5x and AB29x related to renewables*
    - ✓ *$15 million for biomass (dairies and digester gas)*
    - ✓ *$4.5 million for geothermal*
    - ✓ *$30 million transferred to Renewable Energy Program*
    - ✓ *$65 million for renewable loan guarantees and financial assistance*
  - ➢ *$10 million from AB970 related to renewables*
    - ✓ *$7.8 million for biomass projects*
    - ✓ *$2.2 million for PV*

PIER Program

- **$62.5 million per year for energy RD&D**
  - *Six program areas*
  - *Public Interest Focus*



PIER Renewables

- **Mission**
  - ***Using renewables to help make electricity more affordable, more reliable, cleaner and safer while providing enhanced choices to customers***
- **Focus on Higher Value Applications**
  - ***Assess and Target Strategic Value Applications***
  - ***Improve Affordability of Existing Renewable Investments***
  - ***Enhance Abilities to Develop Renewable DG Applications***
  - ***Begin Developing Tomorrow's Electricity System Today***

Assessing and Targeting

- **Assessing Renewables**
  - ➢ *Up-to-date resource assessments*
    - ✓ *Wind, biomass, small hydroelectric, geothermal and solar*
    - ✓ *GIS deployment through CA Department of Forestry*
  - ➢ *Technology and market evaluations and trends*
- **Targeting High Value Applications**
  - ➢ *Strategic Value Analysis*
    - ✓ *Identifies locations and performance characteristics for renewables to provide the highest value to CA's grid*
    - ✓ *Combined GIS and power flow model approach*

Improving Renewable Investments

- **Builds off existing 7000 MW of renewables**
- **Focus on increasing affordability**
  - ➢ ***Increasing efficiencies or capacity factors***
    - ✓ *Wind, solar and small hydro*
  - ➢ ***Lowering O&M costs***
    - ✓ *Biomass, geothermal*
  - ➢ ***Using waste fuels***
    - ✓ *Biomass*
  - ➢ ***Developing value-added revenue streams***
    - ✓ *Biomass and geothermal*

Developing Renewable DG

- **Establishing Renewable DG Pathways**
  - ➢ ***Developing renewable technologies that can be located close to demand centers in high demand, high congestion areas of California***
    - ✓ *Technologies that can match load profiles of demand centers and defer T&D upgrades*
    - ✓ *"Mini-grids" composed of combinations of renewables and fossil technologies*
  - ➢ ***Conducting field verifications to establish track record of emerging renewable DG systems***
    - ✓ *Important for investment funding to complete transfer into market*

Developing Tomorrow's Electricity System

- **Creating Tomorrow's Renewables**
  - ***Enhanced choices to consumers***
  - ***High value to customers and grid***
  - ***Integrate seamlessly into environment***
- **Approaches**
  - ***Simple to use evaluation tools for customers***
  - ***Easy to install and use small modular products located directly at the demand center***
  - ***Super clean, super efficient renewables***